Electronic Supplementary Information

A Microfluidic Biochip Platform for Electrical Quantification of Proteins

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Modified-bead flowing through the channel video

Video1_Valera shows an individual modified-bead flowing through channel (electrodes and aperture). In the video, the modified-bead is flowing by the center of the channel. The aspect ratio between the modified-bead and the aperture can be appreciated. The video is shown in slow motion.

Sampling rate

Based on the dimensions, the volume of the aperture was 6750 μm^3. Thus, the solution required to fill the aperture was 6.75 x 10^{-6} µL. Considering the used flow rate (20 µL min^{-1}), 20 µs were required to fill the aperture. Therefore, in order to meet the Nyquist frequency condition (f > 2 x bandwidth), we must scan at least every 10 µs (100 KHz) to guarantee a perfect reconstruction of the event. Based on this and on the MatLab code requirements, 250 KHz was chosen as sampling rate.

Distinguish between different bead types

The electrical system was able to clearly distinguish between different beads types based on their size and morphology.

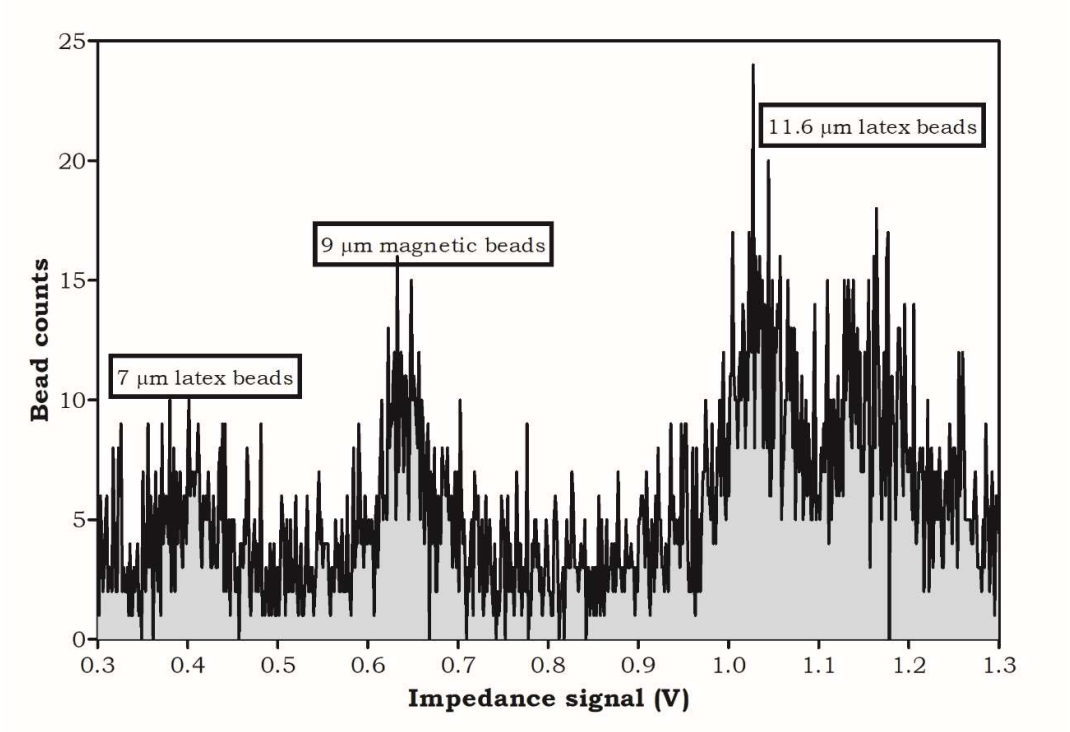

Figure S1. Histogram of unmodified 7 μm latex, 9 μm magnetic, and 11.6 μm latex beads. The electrical system was able to clearly distinguish between size and material.

Bead capture video

Video2_Valera shows biotinylated beads flowing through a small section of the capture chamber (about 50 pillars). In the video, the biotinylated bead flowing in the center of the screen, is specifically captured by the pillar placed on the top center of the screen. The video is shown in slow motion.